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REMARKS

The Office Action of March 23, 2004, enumerates several objections and rejections to many of the pending claims. Each of these objections or rejections will be specifically addressed.

Specification -- Headings

The Examiner has asked that the Headings of the preferred arrangement of a specification be provided in the specification. The Applicant is providing a substitute specification which adds only the new headings with this response to provide the requested headings. No new matter is included in the substitute specification. A copy showing the changes made is provided as Exhibit A, a clean copy is provided as Exhibit B (including the changes to the claims).

Specification -- Informalities

The Examiner has observed that on page 4, line 15 of the specification there is a reference to Figure 1. Since there is no figure 1 in the application, but there are Figures 1A, 1B, 1C, and 1D, reference should have been made to figures 1A-1D as observed by the Examiner. The enclosed amendment to the specification changes "1" to -- 1A-1D --.

Claims Summary

The Examiner has correctly identified the pending claims as claim 1-4 with claim 1 being independent, and claims 2-4 depending from claim 1.

Claim Format

The Examiner has observed that claims 1-4 inappropriately end with two periods instead of one. The enclosed amendment replaces the two periods with a single period. The removal of the second period is not believed to affect the substantive scope of the claims.

Claim Rejections 35 U.S.C. 112

Claims 2-4 depend from claim 1. Claim 1 was rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter the applicant regards as the invention. Specifically, the Office Action objects to the words, "the blade on one side of the blade" as lacking clear meaning. The Applicant was attempting to describe the location of the

shoulder on the one (first) side of the blade, while the uninterrupted surface was opposite the one side (a second side). The “junction of the eye and point portion with the blade” is where the shoulder is located.

As amended, claim 1 (and thus its dependent claims 2-4) are believed to be more clearly understood.

Claim Rejection – 35 U.S.C 102 - Simons

Claims 1, 2 and 4 were rejected as being anticipated by Simons, US Patent No. 358,490. The applicant believes that this rejection may stem from the lack of clarity of claim 1 as originally provided. Specifically, the Office Action states that the middle embodiment of Figure 6 of Simons shows the claimed structure.

In reviewing this figure, the Applicant is unable to locate a “shoulder”. Simons certainly provides a ridge down the center of the blade, and it is believed that the shoulder referred to by the Office Action may be the ninety degree bend where the shank meets the blade which is not the structure the Applicant intended to claim.

Nevertheless, even if this embodiment of Simons has a shoulder, there is no view of the opposite side of any of the blade in any of the drawings. Therefore, as clarified by the amendment to claim 1, there is no way to determine if the opposite side has the uninterrupted surface, or not. Accordingly, this reference does not teach or suggest the provision of an uninterrupted surface on a side of a needle blade opposite a side having a shoulder.

Claim Rejection – 35 U.S.C 102 - Card

Claims 1,2 and 4 were similarly rejected as being anticipated by Card, US Patent No. 2,975,736. Once again, the lack of clarity of the claimed invention is believed to give rise to this rejection. Specifically, in all five figures of Card, a single side (the side that is acted upon by hook) is shown. This is the side that would have the shoulder. Apart from a widening of the blade at the junction where the eye and point portion meet the blade, no shoulder is discernable from the drawings.

More importantly, only a single side of the needle is ever shown in the Card patent. It is the opposite side of the needle that is claimed to have the uninterrupted surface by the Applicant. It is the uninterrupted surface side that is normally provided in the prior art with a “yarn groove” and it is elimination of the yarn groove that is now believed to contribute to providing patentable subject matter.

In Card, a loop shedder is claimed where the slots **24** in the guard member **21** are utilized to assist in removing loops from the hooks **18**. No detail of a needle apart from a shank and an eye are necessary to describe the process to one of ordinary skill in the art. The Applicant believes that needles **11** are representations of needles, and lack additional structure as would have been available in the art at the time.

Claim Rejections 35 U.S.C. 103

Claim 3 is rejected as being obvious over Card, in view of Beyer, U.S. Patent No. 4,563,961. Beyer definitely shows a portion of the claim representing a shoulder which could be land **6**. However, Beyer describes the side opposite the land **6** as having a “yarn groove” (Col. 1, line 6). This groove is shown in the cross sections of both Figures 3 and 4. Furthermore it is also shown in Figure 5.

It is the uninterrupted surface, or a lack of the yarn groove that is the claimed subject matter of claim 1, as clarified by the enclosed amendment.

Claim 3 requires a lead in chamfer which is represented in Beyer as “hollow throat **3**”, not bias grind **14** as referenced by the Office Action: “This bias grind **14** ensures that looper **2** is slidably guided in the region of the needle point **13** out of the **hollow throat 3...**” (emphasis added)(Col. 6, lines 46-48). Nevertheless, it is the side of the blade opposite of the chamfer **3** which fails to meet the limitations of the claims.

Claim 3 also requires the chamfer to extend at least half the width of the blade. If the yarn groove were present opposite the chamfer, it is likely that the material thickness would be insufficient to support operation of the needle. This is the rationale behind the limitations of this claim. The prior art structure does not suggest this additional limitation.

Since none of Beyer, Card, and Simons show the claimed structure, claims 1-4 are believed to be allowable and such action is respectfully requested.

Drawings

The Examiner has correctly observed that Figures 1A through 2A should have been accompanied with the legend -- Prior Art --. This legend is provided in the enclosed drawing correction.

Pertinent Citations

The Applicant would agree that Wignall, Sibley, Jr., and Bledsoe show needles. The applicant would disagree that the claimed structure could be found in any of these references. Bledsoe, U.S. Patent No. 780,970 appears to have similar structure as Simons. Sibley, Jr., U.S. Patent No. 3,364,888, shows one side in Figure 1, and a front and a back in Figures 2 and 3. The side opposite the side shown in Figure 1 is never shown to discern whether or not it has the claimed structure. Furthermore, the illustrated needle is believed to lack detail which would have been provided on a functional needle utilized at that time. Finally, Wignall, U.S. Patent No. 4,103,630, shows another needle illustrated lacking structure which would normally be found on such a needle (the chamfer is missing on the illustrated side of the needle). The only side of the blade viewable is the hook interfacing side of the needle, not the opposite side which the applicant maintains would have a yarn groove if accurately depicted utilizing a needle as was possessed by one skilled in the art.

Conclusion

Accordingly, as effected by the enclosed amendment, there remain four pending claims. Accordingly, no additional fees are believed to be due with this Response. Deposit Account Number 13-3403 may be utilized to charge any miscalculated fees.

Respectfully submitted,

Date: JUNE 23, 2004

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By: Beverly L. Middleton
Beverly L. Middleton

Enclosures: Specifications and Claims

***** VERSION SHOWING CHANGES MADE*****

CLAIMS

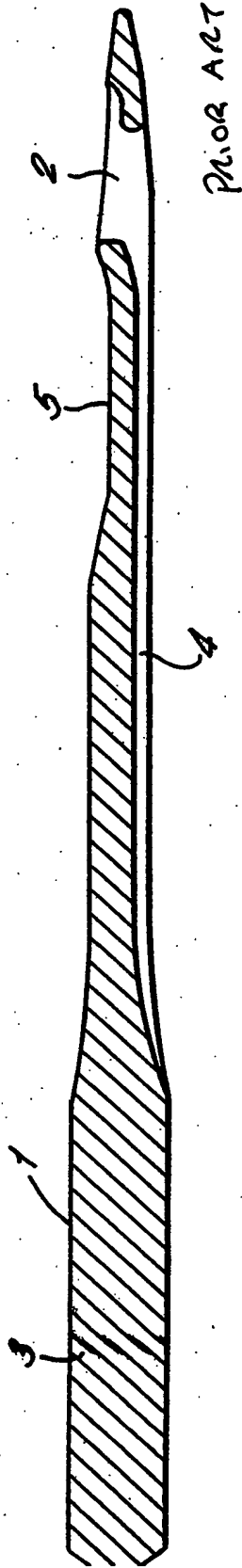
1. (Currently Amended) A tufting needle including a shank having a longitudinal axis, a blade extending from said shank, an eye and point portion including a transverse eye connected to said blade and terminating in a point, a shoulder located at the junction of the eye and point portion with the blade, said shoulder located on [one] a hook interfacing side of the blade, and [the] a second side opposite to said [one] hook interfacing side having a substantially uninterrupted surface intermediate the eye and the shank. [.]
2. (Currently Amended) A tufting needle as recited in claim 1, wherein said uninterrupted surface is substantially flat. [.]
3. (Currently Amended) A tufting needle as recited in claim 1, having a lead-in chamfer on said [one] hook interfacing side which is the width of at least half of the width of said blade. [.]
4. (Currently Amended) A tufting needle as recited in claim 2, wherein said uninterrupted surface lies in a plane and said plane is parallel to a longitudinal axis passing through said eye and said point. [.]



~~Prior Art~~

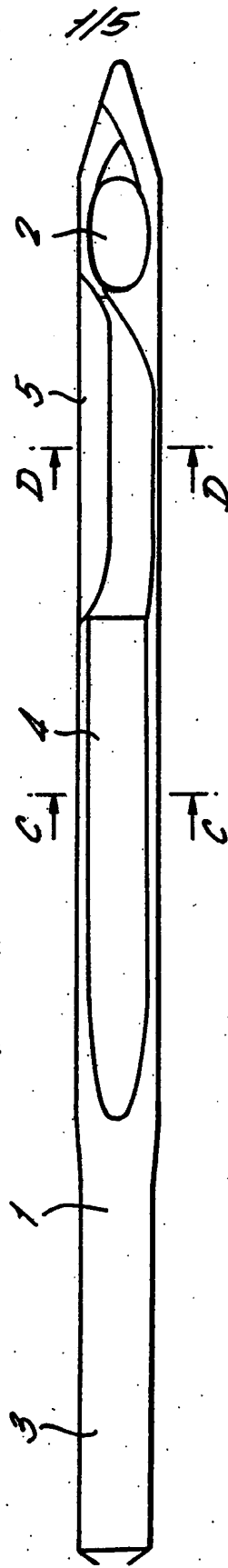
Prior Art

FIG. 1A.



Prior Art

FIG. 1B.



Prior Art

FIG. 1C. Prior Art FIG. 1D.



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PRIOR
ART

FIG. 2.

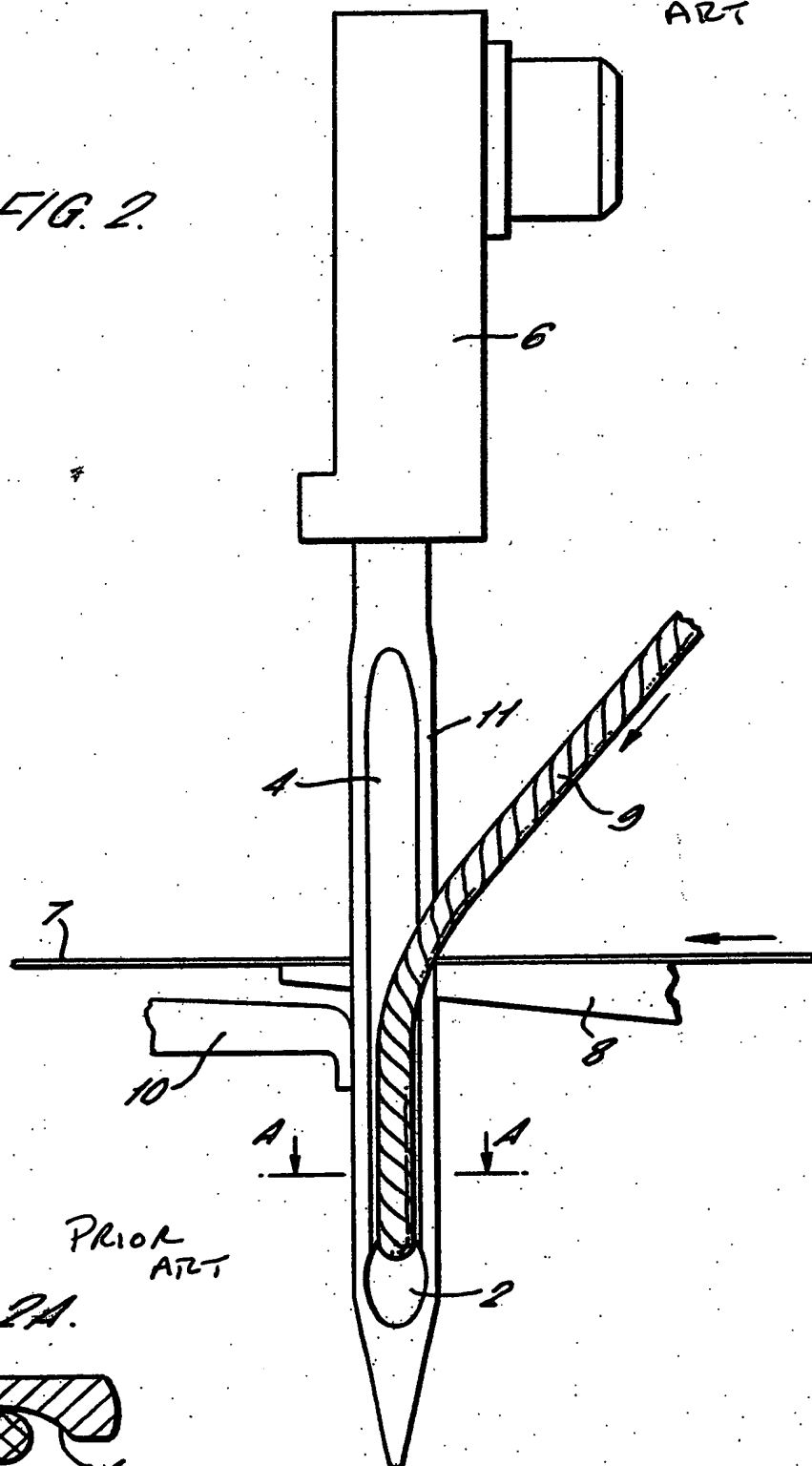


FIG. 2A.



A TUFTING MACHINE NEEDLE

Background of the Invention

Field of the Invention

[0001] The present invention relates to a needle for a tufting machine.

Description of Related Art

[0002] A plurality of needles are provided across the width of the tufting machine. Each needle is threaded with an individual yarn when it is spaced from the backing cloth. In operation the point of the needle first penetrates the backing cloth and continuing movement of the needle pulls the yarn through the backing cloth. On the underside of the backing cloth, the yarn is picked up by a hook or looper which holds the loop of yarn while the needle is retracted back through the backing cloth.

[0003] The tufting needle was originally developed from a sewing machine needle. In all solid, non-hollow tufting needles, a yarn protection groove is provided running along the shank of the needle to protect the yarn during the needle penetration into the backing material. A hook lead-in chamfer is generally provided to facilitate the pick up of the yarn by the hook from the needle.

Summary of the Invention

[0004] According to the present invention there is provided a solid, non-hollow tufting machine needle with a hook lead-in chamfer and without a yarn protection groove.

[0005] The inventor has found that, contrary to conventional wisdom, the yarn protection groove is not necessary in a tufting needle and eliminating it can even provide certain advantages.

[0006] With a yarn protection groove, the yarn crosses the wall of the yarn protection groove in an angular direction at the point of needle penetration into the backing cloth. Thus results in yarn

being trapped between the needle wall and the backing cloth, and also rolls or twists the yarn during the stroke of the needle. This interruption of the yarn flow often creates unevenness on the carpet surface, especially of loop pile fabrics.

[0007] Once the yarn has passed through the backing cloth, the yarn protection groove is unnecessary as there is no yarn restriction and adequate clearance.

[0008] Thus, in effect, it has been found that the yarn protection groove provides little or no benefit.

[0009] By eliminating the yarn protection groove, the needle is stronger and considerably less expensive to manufacture as it does not need to have a complex structure with varying sections of thickness. The manufacturing process can be simplified as multiple die pressing operations and can be reduced or even eliminated.

[0010] The invention also opens up the possibility of producing needles from a flat plate, suitable for moulding in a needle module, or a round bar with a machined or a flat pressed working area for single needles which are inserted into round holes drilled in a needle bar.

[0011] Also, due to the simplicity of the design, the needles can be produced using conventional machine tools, including wire erosion (EDM) instead of the special purpose machines necessary with the conventional design. The needle can also be moulded in tungsten, powder steel metallurgy and tough nylons.

[0012] The additional strength gained by eliminating the groove has resulted in smaller section needles. This, amongst other things, reduces the size of the needle penetration hole in the backing cloth which has significant advantages in tuft retention and backing cloth strength. This is particularly important when tufting into non-woven backing cloths, especially in the

automotive industry where backing cloth strength is vital during the moulding operation of carpets.

[00013] As the yarn protection groove has been eliminated, the lead-in chamfer can be made wider and more gradual, as compared to a conventional needle thereby improving the hook or looper pick-up.

[00014] In order to compensate for the elimination of the yarn protection groove, a chamfer may be provided on the yarn inlet sides of the needle, although this is not believed to be necessary. Alternatively, with a flat plate configuration, the needle can be angled such that the plane of the flat plate is angled with respect to the direction in which, in use, the backing passes through the tufting machine.

[00015] In order to smooth the passage of the yarn through the eye, chamfers are preferably provided on the inlet and outlet to the eye.

[00016] The invention also extends to a needle module having a plurality of needles according to the invention.

[00017] The present invention also extends to a tufting machine having a plurality of needles arranged across the machine, each being arranged to be threaded with an individual yarn when the needle is spaced from a backing material which, in use, is fed through the machine in a direction transverse to the direction in which the needles are arranged, wherein each needle is arranged to penetrate the backing material thereby pulling its yarn through the backing material, and a respective hook or looper is arranged to pick up the loop of yarn from each needle and to hold the loop as the needle is retracted; wherein each needle is a solid, non-hollow needle without a yarn protection groove.

Brief Description of the Drawings

[00018] Examples of a standard tufting needle and a tufting needle in accordance with the present invention will now be described with reference to the accompanying drawings, in which:

Fig. 1A is a cross-section through a conventional needle;

Fig. 1B is a plan view of a conventional needle;

Fig. 1C is a cross-section through line C-C in Fig. 1B;

Fig. 1D is a cross-section through line D-D in Fig. 1B;

Fig. 2 is a schematic showing a conventional needle in use in a tufting machine;

Fig. 2A is a cross-section through line A-A in Fig. 2.

Fig. 3 is a view similar to Fig. 2 showing a first example of the present invention;

Fig. 3A is a cross-section through line A-A in Fig. 3;

Fig. 4 is a schematic, plan view of a needle in accordance with the second example of the present invention;

Fig. 4A is a cross-section through line A-A in Fig. 4;

Fig. 5A is a schematic plan view of a needle in accordance with the third example of the present invention;

Fig. 5B is a side view of the needle of Fig. 5A; and

Fig. 5C is a cross-section through a tip of a needle.

Description of the Preferred Embodiments

[00019] The conventional needle will first be described with reference to Figs. 1A-1D and 2. The needle has an elongate shank 1 at one end of which is an eye 2, and the other end 3 of which is mounted in a needle bar or needle module. A yarn protection groove 4 extends along the shank from a position adjacent to the mounted end 3 and into the eye 2. A hook lead in chamfer 5 is

provided on the opposite side of the needle to the yarn protection groove 4. The lead-in chamfer 5 extends only along the portion of the needle adjacent to the eye 2. It can be seen, particularly from Fig. 1A that the needle has a wide variation of cross-sections along its length.

[00020] The operation of the needle is shown in Fig. 2. The needle is shown mounted in a yarn module 6 in a tufting machine. A number of such needles are arranged perpendicular to the plane of Fig. 2. Backing cloth 7 supported on a series of support fingers 8 is then fed through a tufting machine from right to left in Fig. 2. A yarn 9 which is threaded through the eye 2 of the needle is reciprocated as the needle reciprocates. The yarn is picked up on each stroke by a reciprocating hook 10 to form a series of loops as is well known in the art.

[00021] Initially, the tip of the needle penetrates the backing cloth 7 whereupon the rest of the needle successively follows it through the backing cloth 7. When the needle has penetrated to a sufficient depth (i.e. once the eye 2 has passed through the backing cloth 7), the yarn 9 starts to become trapped between the needle and the backing cloth. The yarn protection groove 4 is designed to prevent this. However, in practice, the only point at which the yarn becomes trapped is at the point where the needle passes through the backing cloth 7. At this point, the yarn 9 passes around a wall 11 of the yarn protection groove, and this tends to roll or twist the yarn during the stroke. Thus, the yarn protection groove does not fulfil its intended function satisfactorily.

[00022] The first example of the present invention will now be described with reference to Fig. 3. This figure is similar to Fig. 2, and common elements have been designated by common reference numerals. The only difference between Figs. 2 and 3, is the configuration of the needle, and, in particular, the absence of the yarn protection groove. From the cross-section of the needle shown in Fig. 3A, it is apparent that the needle is made from a flat plate. It will also be seen that

this flat plate is inclined with respect to the direction in which the backing cloth passes through the tufting machine.

[00023] It will be apparent from the comparison of Figs. 1, 2 and 3 that the needle of the present invention has a far more uniform cross-section than a conventional needle. It should be noted that the yarn 9 passes around the edge of the needle in a similar way to the way in which it passes around the wall 11 of the yarn protection groove 4. In this sense, the invention is believed to be comparable with a convention needle.

[00024] A hook lead-in chamfer 12 is provided on the needle. owing to the absence of the yarn protection groove, this chamfer can be made larger than the conventional needle.

[00025] A second example of a needle in accordance with the present invention is shown in Fig. 4 and 4A. In this case, the needle is also of flat plate construction and has a hook lead-in chamfer 12. However, the flat plate is arranged generally parallel to the direction in which the backing cloth is fed through the tufting machine. However, equally, in Fig. 4A, the chamfer 12 could be provided on the opposite hand surface of the needle if the hook approaches from the same direction as in Fig. 3A.

[00026] A third example of a needle in accordance with the present invention is shown in Figs. 5A-C. The needle has a hook lead-in chamfer 12 as in the previous example. In this case, the only difference is the presence of chamfer 14 on the inlet side of the eye 2 and a chamfer 15 on the outlet side of the eye 2. As will be appreciated from Fig. 5C, this provides a smoother path for the yarn through the eye 2.

[00027] Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to the preferred embodiment of the invention which is for purposes of illustration only and not to be

construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

[00028] Having thus set forth the nature of the invention, what is claimed herein is:

***** VERSION SHOWING CHANGES MADE*****

CLAIMS

1. (Currently Amended) A tufting needle including a shank having a longitudinal axis, a blade extending from said shank, an eye and point portion including a transverse eye connected to said blade and terminating in a point, a shoulder located at the junction of the eye and point portion with the blade, said shoulder located on [one] a hook interfacing side of the blade, and [the] a second side opposite to said [one] hook interfacing side having a substantially uninterrupted surface intermediate the eye and the shank. [.]
2. (Currently Amended) A tufting needle as recited in claim 1, wherein said uninterrupted surface is substantially flat. [.]
3. (Currently Amended) A tufting needle as recited in claim 1, having a lead-in chamfer on said [one] hook interfacing side which is the width of at least half of the width of said blade. [.]
4. (Currently Amended) A tufting needle as recited in claim 2, wherein said uninterrupted surface lies in a plane and said plane is parallel to a longitudinal axis passing through said eye and said point. [.]

ABSTRACT

[00029] A tufting needle which has a transverse eye between the blade of the needle an the point and has a clearance above the eye in the blade on one side and has no yarn guide and protection groove on the opposite side. Also, disclosed is a conventional tufting needle which has the conventional yarn guide and protection groove. .